WARZYN

Plan
Project No. 60251

Health and Safety Plan
Remedial Investigation/ Feasibility Study
American Chemical Services, Inc.
Griffith, Indiana

Prepared for:

American Chemical Services
Steering Committee
Chicago, Illinois

Prepared by:

Warzyn Engineering Inc.
Chicago, Illinois

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SITE HEALTH AND SAFETY PLAN

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

AMERICAN CHEMICAL SERVICES
GRIFFITH, INDIANA

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1.0 SITE SUMMARY AND PROBLEM IDENTIFICATION

The ACS site is located at 420 South Colfax Avenue, 1/2 mile southeast of Griffith, Indiana, in the northwest 1/4 of the southeast 1/4, Section 2, Township 35 North, Range 9 West, Lake County Indiana (Figure 1). Although the site name is ACS, the United States Environmental Protection Agency (U.S. EPA) has defined the site as including the inactive portion of the 31-acre Griffith Landfill, the 2-acre Pazmey Corporation site (formerly Kapica Drum, Inc.), and the ACS property (19 acres).

There are railroad tracks bordering the study area on the north, south, and west, and tracks also bisect the study area in a NW-SE direction. The topography at the site is almost level in the portion north of the railroad and rises slowly from 630 to 645 feet MSL in the southern half of the site. A marsh to the north of the landfill and west of the ACS property has a surface elevation of about 625 feet MSL. Surface water channels exist north and south of the marsh. A small pond is located on the ACS property. There are numerous buildings and tanks located on the ACS property, and the Pazmey property. Trees are growing west and south of the ACS property.

On the ACS property is an active hazardous waste storage and treatment facility operating under RCRA interim status. From 1955 to at least 1975, ACS disposed of hazardous wastes on its property, primarily from on-site chemical manufacturing and solvent reclamation operations. Some wastes were accepted from off-site sources for incineration in the ACS on-site incinerator. The incinerator-generated ash was then disposed of on ACS property.

The Griffith Landfill is an active sanitary landfill operation. About five acres on the southern portion of the study area are active disposal areas. Inactive portions were reported to have received hazardous wastes from ACS and Kapica Drum, Inc. prior to RCRA. Kapica Drum Inc. was a drum reconditioning facility which generated drum residues and rinse water from cleaning drums that contained hazardous wastes. Figure 2 summarizes the interrelationship between ACS, Kapica Drum, Inc., and the Griffith Landfill based on a review of available information. For a more detailed site history, refer to the ACS Initial Site Evaluation Report (document number 160-WP1-RT-AUJD-1).

The objective of this Remedial Investigation/Feasibility Study (RI/FS) is to evaluate the existence and magnitude of contamination, and recommend a cost effective, viable remedial action alternative(s) for mitigating any hazard posed by the site. The RI/FS will be performed to gather and assess information needed to accomplish the following objectives:

- Determining if the ACS site poses a risk to public health, welfare, or the environment.
- Determining the characteristics, extent and magnitude of contamination at the site.
- Defining the pathways of contaminant migration from the site.
- Defining on-site physical features and facilities that could affect contaminant migration, containment, or cleanup.
- Developing viable remedial action alternatives.
- Evaluating and screening remedial action alternatives.
- Recommending the cost-effective remedial action alternative which adequately protects health, welfare and the environment.

All tasks, subtasks, and activities are directed toward the accomplishment of these primary objectives.

Under the Superfund Amendments and Reauthorization Act of 1986 (SARA), it is recommended that the RI/FS are integrated so that parts of each are conducted concurrently. Therefore, the project will be designed to make optimal use of information as it is derived and to produce the information which is necessary to complete the FS. Because this approach makes use of the most current information, data overlaps and data gaps are minimized. The phased approach allows "mid-course" corrections to be made so that the investigation will development in the most efficient and cost-effective sequence.

The remedial investigation field work will result in the collection of 68 source characterization samples from the documented and suspected waste burial and soil contamination areas at the site. In addition, 187 site characterization samples (groundwater, surface water, sediment, private well and geotechnical) will be collected during the remedial investigation field work.

The feasibility study will include the initial screening of candidate remedial alternatives and subsequent detailed evaluation of selected alternatives. Technical, environmental, economic, and institutional criteria will be utilized to perform the alternative evaluations. A conceptual design and associated cost estimates will be prepared for the recommended remedial strategy.

2.0 CONTAMINATION PROBLEM DEFINITION

2.1 WASTE DISPOSED OF AT THE SITE

Based on available information there are four documented waste burial locations, one suspected waste burial location and four suspected contaminated soil areas. Figure 3 shows the locations of each of these areas, and Table 1 summarizes the corresponding waste types.

2.2 DISCUSSION OF CONTAMINANTS

Samples collected prior to this investigation indicate contaminants are present in the groundwater, surface water (or leachate), and soils. Results from analysis of samples from the existing groundwater well system indicate the presence of organic compounds such as benzene, toluene, vinyl chloride, trichloroethylene, phenol and pentachlorophenol. Soil/sediment analysis have indicated the presence of benzene, toluene, naphthalene, phthalate esters, phenanthrene and anthracene. Ponded surface water/leachate have also shown the presence of naphthalene, phthalate esters, phenols, and (2-ethoxy) acetate, plus metals (cadmium, lead, chromium, nickel, mercury) and cyanide.

3.0 HAZARD EVALUATION

3.1 SUBSTANCES OF CONCERN

A wide variety of potential substances of concern have been identified at the ACS Site. The following discussion highlights those chemicals, chemical groups, and materials which appear to pose the greatest health and safety concerns. These are discussed in relation to the matrix (i.e. soils, surface water, sediment, groundwater) in which they occur. All sample matrices indicate contamination to some extent.

Tables 2, 3 and 4 outline the highest value for compounds or elements found in the matrices (i.e. groundwater, soil or leachate/sample water).

3.2 HEALTH AND SAFETY RELATED TO SUBSTANCES OF CONCERN

Because the number of individual organic and inorganic chemicals and compounds is so extensive, it would be excessive to discuss each one individually. Therefore, they are discussed below as groups or classes. Refer to Attachment A for definition of terms and acronyms.

Polynuclear Aromatic Hydrocarbons (PAH's)

This group includes a great number of chemical compounds which are common in our environment and vary widely in their potential impact on human health. Some of the most powerful carcinogens are PAH's. Most PAH's occur in the environment as complex mixtures which consist of both carcinogenic and non-carcinogenic PAH's. The toxic effect of PAH's through absorption (by way of inhalation, ingestion, or dermal contact) appears to be based on a high level of exposure over a relatively long time period.

Halogenated Hydrocarbons

These compounds are highly mobile, migrating easily through water, air, and soil. They are persistent in the underground environment, although they may degrade at the surface under the influence of ultra-violet light.

Halogenated hydrocarbons may act on the central nervous system, either as a stimulant or depressant. Mild exposure may cause such symptoms as dizziness, nausea, abdominal pain, and vomiting. In chronic (long-term) exposure, loss of weight and appetite may occur. Moderately severe exposure presents those symptoms given above followed by severe irritability, convulsive seizures, and coma. Chemical hazard information is summarized in Table 5.

Compounds detected as the site include:

1,2-Dichloroethene - a colorless, volatile liquid with a pleasant odor. Used as a solvent in perfumes, lacquers, thermoplastics, and organic synthesis. Produces drowsiness and effects the central nervous system. ACGIH recommends a TLV of 200 ppm. No STEL is recommended.

1,1,1-Trichloroethane (Methyl Chloroform) - a clear, non-flammable liquid used primarily as a cleaning solvent. It may affect the gastrointestinal tract and the central nervous system. May cause anesthesia and death at high concentration (14,000-15,000 ppm). Lower concentration exposures, repeated daily, do not generally produce significant health effects. ACGIH recommends a TLV of 350 ppm to prevent beginning anesthetic effects and objections to odor. A STEL of 450 ppm is recommended for protection against anesthesia. Odor threshold is 100 ppm.

Trichloreoethylene (TCE) - a colorless, non-flammable liquid with a sweet odor like chloroform. Can be adsorbed through the skin. Inhalation and ingestion are also routes of exposure. Symptoms of exposure include headaches, dizziness, disturbed vision, nausea, vomiting, and eye irritation. Fatalities have occurred following severe, acute exposures. It has been known to cause cancer in laboratory animals. ACGIH recommends a TLV of 50 ppm. Odor threshold is also 50 ppm.

Vinyl Chloride - an easily liquified gas with a faintly sweet odor. It may affect the central nervous system, liver, respiratory system and lymphatic system. It is a known carcinogen. The ACGIH recommends a TLV of 5 ppm.

Light Aromatic Hydrocarbons

Compounds in this group are highly volatile, moderately soluble, biodegradable, and only slightly adsorbed on soils and sediments. Their presence at the surface is based on volatilization rates and biodegradation activities. In the groundwater environment, they are persistent and mobile. Exposure to these substances is primarily through vapor inhalation, although

absorption through the skin may also readily occur. Acute exposure poses the primary health hazard of these substances. Low level exposure may result in irritability, excitability, muscle tremor, and headache. Some of the more notable light aromatic compounds which are present include ethyl benzene, xylene, and toluene.

Ethylbenzene - colorless, flammable liquid with aromatic odor. Explosive limits of 1% to 6.7% by volume in air. Toxicity is characterized by irritancy to skin and, to less extent, mucous membranes.

5,000 ppm - intolerable irritation

2,000 ppm - IDLH, immediate and severe eye irritation and moderate nasal irritation.

1,000 ppm - irritation and tearing of eyes, tolerance develops rapidly.

200 ppm - moderate and occasional eye irritation.

Low acute toxicity. TLV = 100 ppm. STEL = 125 ppm.

Prolonged exposure may cause chest constriction leading to conjestion of the brain and lungs with edema.

Xylene - clear, flammable liquid with aromatic hydrocarbon odor. Exposure symptoms include headache,eye irritation, fatigue, irritability, nausea, and anorexia. Chronic exposure may result in injury to heart, liver, and/or kidneys.

TLV = 100 ppm. STEL = 150 ppm. NIOSH recommends TWA of 100 ppm and 10 minute ceiling of 200 ppm.

Toluene - flammable, colorless liquid with aromatic hydrocarbon odor. Explosive limits of 1.3% and 7.1% by volume in air.

500 to 1,500 ppm - heart palpitation, extreme weakness, loss of coordination.

200 to 500 ppm - impairment of coordination, momentary loss of memory.

Less than 200 ppm - headache, lassitude, nausea

TLV = 100 ppm. STEL = 150 ppm.

Prolonged exposure has acted as a mutagen in experimental animals.

Phenol

Phenol is a solid or liquid with sweet tarry odor similar to railroad ties. Explosive limits 1.7% to 8.6% by volume in air. Exposure symptoms - will burn eyes and skin and it acts as a poison on the central nervous system. The analgesic action may cause loss of pain sensation. Prolonged exposure has acted as a carcinogen and mutagen in experimental animals. TLV = 5 ppm. IDLH = 100 ppm.

PCBs

These compounds are readily absorbed through the skin and permeate most protective clothing within a relatively short time period. Exposure to PCBs may cause chloracne (a reddish eruption of the skin), irritation of the respiratory system, and liver damage. PCBs have been shown to cause birth defects in developing fetuses and are suspected of carcinogenic activity. The members of this group have low vapor pressures and thus do not volatilized quickly. The greatest threat of exposure comes from direct contact with contaminated soils and waters, or by inhalation of contaminated dusts or aerosols. The OSHA standard for PCB is 0.5 mg/cubic meter (54% chlorine) and 1 mg/cubic meter (42% chlorine), while NIOSH recommends an 8-hour TWA of 0.001 mg/cubic meter for all PCBs.

Heavy Metals

Heavy metals may become absorbed onto soil particles and therefore are of concern if dry, dusty conditions prevail. Lead has a Permissible Exposure Limit (PEL) of 0.05 mg/cubic meter. Chronic overexposure may case brain damage, gastrointestinal disturbances, anemia, and kidney damage.

Ingestion or inhalation of chromium may lead to histologic fibrosis of the lungs. The TLV for chromium is 0.5 mg/cubic meter, and the IDLH Level is 500 mg/cubic meter. Minimum tolerance (less than 30 minutes) is 0.025 mg/cubic meter. Recommended TLV = 0.002 mg/meter. This element is also a suspected carcinogen. Chromium poses a potential health risk by inhalation, ingestion, or skin absorption. Its allowable airborne concentration has been established at 0.5 milligrams per cubic meter of air. Exposure to chromium may cause an allergic type reaction producing dermatitis or lung irritation.

Symptoms of exposure may include coughing, wheezing, headaches, difficult breathing, and fever. The skin may become red, inflamed, itch, and ulceration may occur.

Cyanide

Most cyanide compounds and hydrogen cyanide (HCN) gas can be readily absorbed through the skin. Inhalation of HCN or dust of cyanide compounds and ingestion of cyanide compounds are also a route of entry. Skin absorption is accelerated by sweating and the presence of open wounds. Once cyanide has entered the body, it acts as a very rapid acting blood poison interrupting the transport of oxygen.

Cyanide and cyanide compounds are mainly of concern in regard to the respiratory dangers they present. Hydrogen cyanide gas and volatile cyanides are all highly toxic by brief, high level exposures and can cause death. Cyanide is a noncumulative poison, and therefore chronic toxicity is not a major concern. Acute exposure to hydrogen cyanide may result in symptoms such as headache, weakness, changes in taste and smell, irritation of throat, vomiting, difficulty breathing, abdominal colic, and nervous instability. Hydrogen cyanide has the characteristic faint odor of bitter almond. The TLV for cyanide and cyanogens is 10 ppm.

3.3 HEALTH AND SAFETY HAZARDS RELATED TO ON-SITE ACTIVITIES

Drilling operations will pose those physical threats normally associated with drilling. Typical hazards associated with drilling include: falling objects, fueling engines, rotary equipment, cables, ropes, derricks, overhead powerlines, and lightning. Personnel should stay away from the drilling operations unless their persence is necessary to perform their duties. Hardhats and steel-toe shoes are appropriate for personnel working near rig. A face shield may be appropriate depending upon drilling methods being used. In addition, the possibility of respiratory and dermal contact with contaminants will also be prominent during these activities.

3.4 GENERAL ON-SITE FIRST AID

The following discusses general on-site First Aid procedures for exposure to contaminants on-site:

- Contaminated Materials In Eyes - wash with copious amounts of water for at least 15 minutes. Lift upper and lower lids occasionally. Seek medical attention immediately. (Eye wash will be available on-site.)

- Contaminated Materials Contact Skin - promptly wash area with soap or mild detergent and water. Flush well with water. Check for signs of skin irritation. Seek medical attention if unusual appearance of skin or sensation is noted.

- Contaminated Materials Penetrate Protective Clothing - discard protective clothing and underlying clothing. Wash skin as described above. Confer with Site Safety Officer in selection of new protective clothing.

- Inhalation of Contaminated Air - move person to well ventilated area at once. If individual is not noticeably effected, and has no side affects after about five minutes, returning to work is allowed providing the work area is no longer contaminated. If individual has not fully recovered, continue to monitor for 15 - 20 minutes and seek medical attention if necessary. Use artificial respiration if breathing has stopped. In such instances, seek medical attention after victim has resumed breathing. If possible, have someone seek medical attention while person is being resuscitated.

- Ingestion of Contaminated Materials - flush mouth with water, being careful not to swallow. Contact local poison center (see telephone number in Emergency Response and Information section). When called for, induce vomiting by physical means or with Syrup of Ipecac (DO NOT induce vomiting in unconscious persons). Seek medical attention promptly.

If, at any time, personnel feel fatigued, dizzy, nauseous, or experience headache, they should be moved to a well ventilated area and allowed to rest for 15 to 30 minutes. If symptoms do not subside, seek medical attention.

The wearing of contact lenses will not be allowed when respirators are worn.

Other emergency equipment and its location is presented in Section 10 - Emergency Response and Information.

3.5 QUALIFICATIONS AND RESPONSIBILITIES OF SITE SAFETY OFFICER AND ON-SITE PERSONNEL

The Site Safety Officer (SSO) shall receive or will have completed the following training:

- Hazardous Waste Site Investigation Training Program (Warzyn's in-house training program or equivalent),
- Respiratory Protection Training, and
- Air Monitoring Equipment Training.

When Level B is to be used, a Site Safety Officer skilled in the set-up and use of air supply systems (cascade system, air-supply hose manifold, tank recharging, etc.) will be on-site.

The Site Safety Officer will be responsible for instructing the work team in the Site Health and Safety Plan and in supervising the implementation of the plan on-site. The SSO will be responsible for personnel and environmental monitoring, including maintenance of air quality monitoring equipment.

Specific responsibilities include:

- Thoroughly understanding the site work plan,
- Verifying that site personnel have received proper training and participate in medical surveillance program,
- Verifying that site personnel have appropriate safety equipment,
- Establishing work and decontamination zones,
- Performing or supervising ambient air quality monitoring as needed during drilling and other activities,
- Modifying Site Health and Safety Plan as needed and notifying appropriate personnel of changes,
- Notifying State and local agencies of any contaminant releases (See Section 10 - Emergency Response and Information Section).

- Maintaining and using (as necessary) emergency equipment (See Section 10 - Emergency Response and Information Section).

The Site Safety Officer will have the authority and responsibility to shut down operations, if necessary.

All personnel are responsible for understanding and complying with the Site Health and Safety Plan. Employees are responsible for reporting any unsafe acts or conditions, safety incidents, accidents, injuries, or exposures to the Site Safety Officer.

As pursuant to 29 CFR 1910.120[e] (OSHA); all on-site personnel shall have received a minimum of 40 hours of off-site classroom training. This training shall include, but not be limited to those topics addressed in that section. Warzyn's in-house Basic Hazardous Waste Site Health and Safety training meets these requirements. Non-Warzyn personnel will be required to provide documentation as to their training. An on-site start-up health and safety meeting and daily morning safety briefings will also be required. This health and safety plan will form part of this training, and will be provided to all site personnel. All on-site training will be documented in the site log book.

Also required by 29 CFR 1910.120[f] (OSHA); all on-site personnel that have a potential for exposure to hazardous material, or will be required to wear a respirator, must receive a physical examination that will determine their fitness for these tasks. This determination will be received before any field work will begin.

4.0 SITE WORK PLAN

4.1 GENERAL

1. All personnel at the site (workers and visitors) will be required to read the Site Health and Safety Plan and sign a statement indicating that they have done so.

2. All visitors to the site must check in with the Site Project Manager or Site Safety Officer. A sign will be posted at the entrance gate indicating this procedure.

3. Special emergency equipment (eyewash, fire extinguisher, first aid kits, etc.), will be maintained on-site. The location of this equipment is presented in Section 10 - Emergency Response and Information Section.

4. All self-contained breathing apparatus (SCBA) or airline respirators used on site will be positive pressure demand.

5. Whenever possible, drill rigs will be located so the rear of the rig is pointing upwind of each respective drill hole.

6. All split-spoons and Shelby tubes will be THOROUGHLY STEAM CLEANED PRIOR TO USE AT THE SITE. Similarly, all paint on new split-spoons will be carefully removed.

   All drilling equipment which comes into contact with soils will be steam cleaned between holes. The drill rig will be steam cleaned as appropriate or necessary to guard against cross-contamination.

4.1.1 Personal Protective Equipment

The following equipment will be used for Level B protection:

- Polycoated Coverall
- Steel-toe/Steel-shank Leather Boots with Neoprene Overshoe OR Neoprene Boots with Steel-toe/Steel Shank
- Latex Booties
- Surgical Gloves
- Neoprene Gloves

- Self-contained Breathing Apparatus (SCBA) or Air-line Respirator with 5-minute escape pack
- Hardhat

The following equipment will be used for Level C protection:

- Polycoated Tyvek Coverall
- Steel-toe/Steel-shank Leather Boots with Neoprene Overshoe OR Neoprene Boots with Steel-toe/Steel Shank
- Latex Booties
- Surgical Gloves
- Neoprene Gloves
- Full-face, Air-purifying Respirator w/combination cartridge
- Hardhat

The following equipment will be used for modified Level D protection:

- Polycoated Tyvek Coverall
- Steel-toe/Steel-shank Leather Boots with Neoprene Overshoe OR Neoprene Boots with Steel-toe/Steel-shank
- Latex Booties
- Surgical Gloves
- Neoprene Gloves
- Safety Glasses or Face Shields
- Hardhat

The following equipment will be used for modified Level E Protection:

- Steel-toe/steel-shank leather boots OR Neprene Boots with steel toe/steel shank
- Hardhat
- Long Sleeve Shirt
- Heavy Pants

Respirator cartridges will be NIOSH approved high efficiency, organic vapor/acid gas/dust (such as MSA brand GMC-H).

Drill crew personnel will tape the wrists and ankles of their protective clothing with duct tape to ensure a complete seal.

4.1.2 Surveillance Activities and Action Levels

The air monitoring program will begin with an air monitoring survey of the site to assess the ambient conditions. The frequency of air monitoring, for tasks which do not disburb the ground, will be determined in part based on this survey. Other factors such as temperature and windspeed will also be considered.

Frequent air monitoring will be conducted for surface type of tasks such as sediment sampling, and groundwater sampling.

Nearly constant air monitoring will be conducted while drilling into refuse and excavation of test pits.

An HNu Photoionizer (with 11.7 ev lamp) may be used by the Site Safety Officer for periodic monitoring of air quality at the work sites. This will be done to assess the relative levels of organic airborne contaminants, aiding in site assessment.

A Bacharac GPK Combustible Gas and Oxygen Meter may be used to detect the presence of explosive gases.

A Monitox hydrogen cyanide detector may be used to detect hydrogen cyanide during waste characterization operations.

A Rad-mini may be used to detect the presence of radioactive materials.

Selected Draeger tubes may be used to verify the presence of particular volatile contaminants such as hydrogen cyanide.

The following action levels will be observed during any on-site activity:

EXPLOSIMETER (Ambient Air Measurements)

0-10% LEL - proceed w/caution

10-25% LEL - proceed w/caution, be prepared to shut-down quickly

over 25% LEL - shut-down immediately and evacuate. Do not resume excavation until LEL falls below 10%. If LEL remains above 25%, continued excavation will be at discretion of Site Safety Officer.

HNu (Breathing Zone)

- o Enter Site at Level C
- o 5 ppm or greater detected, upgrade to Level B
- o If any above-background readings up to 5 ppm detected, remain at Level C. Monitor ambient air as often as possible to detect any change in detection levels.

MONITOX: A level of 10 ppm hydrogen cyanide will require immediate evacuation of the work area. The Site Safety Officer will verify the monitor reading by sampling the area with a hydrogen cyanide Draeger Tube. If the results are positive, the hydrogen cyanide contingency plan (Attachment C) will be initiated.

RAD-MINI: Less than 1 mR/hr., continue investigation; above background but below 10 mR/hr, continue investigation but perform more extensive and continual monitoring; above 10 mR/hr, evacuate site and consult with client.

Several of the modified subtasks outlined in the work plan are specified as being performed in Level D protection. Level D has been selected because those activities appear to have low potential for exposure of field personnel to hazardous materials. However, because of known surface soil contamination at the site, dust conditions may present a potential health threat. The Site Safety Officer may therefore upgrade Level D activities to Level C or B, based on soil moisture conditions and wind factors.

4.2 Specific Field Activities

Subtask 1B Site Survey
Surveying personnel will be in modified Level E protection as described in 4.1.1.

Subtask 1C Geophysical Survey
Surveying personnel will be in modified Level E protection as described in 4.1.1

Subtask 1D Surface Water Survey
Surveying personnel will be in modified Level E protection as described in 4.1.1

Activity 2A.1 Monitor ACS Hydraulics
Personnel will begin monitoring activities at Level C and the Safety Officer may upgrade or downgrade the personal protective level as described in 4.1.2

Activity 2.A.2.a. Install Leachate Wells
Level C protection as described in 4.1.1 will be worn during installation of wells into the landfill, with possible upgrade or downgrade of level of protection by the Safety Officer as described in 4.1.1 and 4.1.2.

Activity 2A.2.b. Monitoring De-Watering Pumpage
Activity will begin at Level E with possible up or downgrade of level of personal protection by the Safety Officer as described in 4.1.1 and 4.1.2.

Activity 2A.3 Install Perimeter Monitoring Wells
Activity will be conducted at Level C with possible up or downgrade of level of personal protection by Safety Officer as described in 4.1.1 and 4.1.2.

Activity 2A.3.a. Test Near Surface Hydraulic Properties
Activity will begin at Level C with possible up or downgrade of level of personal protection by the Safety Officer as described in 4.1.1 and 4.1.2.

Activity 2A.4 Install Piezometer Grid
Level D will be worn for those locations outside the landfill. Inside the landfill area, Level C will be worn, with possible up or downgrade of level of protection by the Safety Officer as described in 4.1.1 and 4.1.2.

Activity 2B.1 Effluent Sampling
Level D will be worn with possible upgrade of level of protection by the Safety Officer as described in 4.1.1 and 4.1.2.

Activity 2B.2 Groundwater Sampling for Perimeter Wells and Leachate Wells
Level D will be worn for sampling perimeter wells and leachate wells, with possible upgrade of level of protection by the Safety Officer as described in 4.1.1 and 4.1.2.

Activity 2B.3 Surface Water and Sediment Sampling
Level E will be worn as described in Subtask 2B.2.

Activity 3A.1 Soil Borings, Test Pits and Surface Soil Sampling
Level B will be worn during test pit excavations. The backhoe operator will remain in cab to enable quick closure of pit in event of an emergency. Excavated material will be placed at the downwind end of the pit for inspection. At no time will an open pit be left unattended. All test pits will be filled before beginning a new excavation, and at the end of each working day.

Potential physical hazards include: cave-in, overhead wires, and underground utilities or objects. Local utilities will be contacted to review locations.

Level D will be worn during surface soil sampling and soil borings.

Activity 4A.1 and 4A.2 Well Installation and Aquifer Testing
Level C will be worn as described in Activity 2A.3 during well installations. Level D will be worn during aquifer testing as described in Subtask 2B.2.

Activity 4A.3 On-site Well Installation and Private Well Sampling
Level C will be used for well installation as discussed under Activity 2A.3. Sampling of private wells will not require any special personal protective equipment.

Subtask 4B. Soil Contamination
Level D will be worn as described in Subtask 2B.1.

5.0 DECONTAMINATION PROCEDURES

Every attempt will be made to prevent direct contact with contaminated materials. The sequential removal and decontamination or disposal of potentially contaminated personal protective equipment is required to prevent the migration of contaminants to the support zone where personal protective equipment is not required.

All personnel, equipment and vehicles coming in contact with contaminated materials or areas will be required to go through decontamination procedures.

Site personnel decontamination procedures:

- Prior to entering the contamination reduction zone, remove gross contamination from protective garments and footwear
- Remove and dispose of outer latex booties
- Wash boots in trisodium phosphate detergent (TSP) bootwash
- Clean outer gloves in TSP wash solution (discard if too soiled to clean thoroughly)
- Remove and dispose of polycoated tyvek suits
- Respirator or SCBA is removed and either prepare for reuse or undergo daily decontamination procedures
- Remove and dispose of surgical gloves
- Wash hands in hand wash

All site personnel will perform the above mentioned decontamination procedure prior to leaving the site. Additionally, all personnel upon reaching their residence must shower.

Discarded clothing and other articles will be collected in double-lined, heavy-duty garbage bags and stored on-site.

Equipment and vehicle decontamination procedure:

- Decontamination will be performed on-site
- Gross contamination will be removed with a brush and TSP solution
- Steam cleaning will follow

All drilling equipment will be steam cleaned prior to exiting off-site. This will be conducted at the "Equipment and Vehicle Area". Another area located away from this area will be designated as the "Site Personnel Decontamination Area" and will be used as outlined.

Decontamination wash waters and cutting from the drilling activities will be left on-site and stored in DOT 55-gallon hazardous waste drums or equivalent or staged on visqueen and tarped.

Equipment remaining at the site may not be decontaminated, but will be stored on the contaminated side of the equipment and vehicle decontamination area at the end of each day.

Special care will be taken that **ALL SPLIT-SPOONS AND SHELBY TUBES ARE THOROUGHLY STEAM CLEANED PRIOR TO USE AT THE SITE.** Similarly, any paint on split-spoons will be thoroughly removed.

6.0 DISPOSAL OF INVESTIGATION-DERIVED WASTE MATERIALS

Used wash water generated at the Personnel Decontamination Area will be considered non-hazardous, not warranting special waste disposal. This water will be disposed at the site where it was generated. Contaminants brushed off and steam-cleaner-removed from equipment and vehicles will be stored in DOT, 55-gallon drums or equivalent.

Bags containing contaminated personal protective equipment and related articles will be stored on-site and disposed accordingly at the completion of RI/FS and stored in DOT, 55-gallon drums or equivalent.

Soil, waste cuttings, and purge water from soil boring, well installations, and sampling will remain on-site and stored in DOT, 55-gallon drums or equivalent. These materials will be disposed at the completion of the RI/FS activities pending the findings of the RI/FS sampling analysis and/or remediation alternative.

7.0 HOT AND COLD WEATHER CONSIDERATIONS

Special care will be taken to insure that work crew personnel do not suffer physical distress as a result of working under hot or cold weather conditions. This is discussed in Appendix B. Guidelines presented in this discussion will be generally followed. Individual physical differences and varying susceptibilities to heat stress will be considered in scheduling work activities.

8.0 WORK LIMITATIONS

In general, all field activities will be restricted to daylight hours. No drilling or other heavy machinery will be operated after daylight hours. Lightning conditions will necessitate shut-down of drilling operations. In the event of rain, the Drill Crew Supervisor and Site Safety Officer will determine the need for suspending drilling operations. The Site Safety Officer and Site Project Manager will be responsible for determining continuance/shut-down of field activities during adverse weather conditions.

9.0 PERSONNEL RESPONSIBILITIES AND TRAINING

Training for on-site personnel shall conform with OSHA 29 CFR 1926, subpart "c", General Safety and Health Provisions. There will be an initial Site Safety Meeting, during which all site workers will be supplied with a copy of the Health and Safety Plan. The Site Safety Officer will discuss the site, and workers will be instructed in the recognition, avoidance and prevention of unsafe activities and conditions. Emergency practices and procedures will be reviewed.

The following table lists specific personnel, and job positions.

Team Member	Responsibility
_____	Project Manager
_____	On-Site Project Manager
_____	Team Leader/Hydrogeologist
_____	Site Safety Officer
_____	Drill Crew Supervisor
_____	Drill Crew Supervisor
_____	Driller's Assistant
_____	Driller's Assistant
_____	Field Technician
_____	Field Technician

Note: Names will be filled in later as specific assignments are made.

Required Training

RI/FS Hazardous Waste Site Investigation Training
Medical Monitoring Program
Respiratory Protection Training

The Hazardous Waste Site Investigation Training shall consist of Warzyn's in-house training program or equivalent. Respiratory Protection Training is included in this program, and additional training will be given on-site by the Site Safety Officer.

10.0 EMERGENCY RESPONSE AND INFORMATION

10.1 PREARRANGEMENTS

Local police, fire, emergency squads and hospitals will be contacted prior to the initiation of site activities. They will be informed of the location of the site, activities which are to be conducted, time schedules, and potential hazards associated with the work and the area. If possible, a field radio will be obtained from these agencies, providing immediate contact with them. The Site Safety Officer will retain any such radios.

10.2 ON-SITE COMMUNICATION SYSTEM

On-site communication procedures will be established in the field during the initial site briefing or whenever there is a change of site personnel. An emergency signal will be designated and all employees will be made aware of assembly points in the event of an emergency. Signal devices, for example hand-held air horns, will be placed in the office trailer and at the outer perimeter of the contamination reduction zone.

10.3 WORK SITE EMERGENCY PROCEDURES

In the event of a medical emergency at a work site, work crew personnel will act quickly and reasonably to remedy the situation. If the Site Safety Officer is present, the SSO will give directions as to how to proceed. If not, the SSO will be contacted by phone. If unavailable, the local Emergency Squad will be contacted.

Special care will be taken if rescue efforts are necessary. All personnel shall utilize extreme caution and take all possible steps to be as adequately protected as possible before attempting such rescue.

In the event of a hazardous gaseous release, work crew personnel will depart the work site, moving 100 feet upwind and regrouping. The Site Safety Officer will then be conferred with.

10.4 EMERGENCY EQUIPMENT

The following emergency equipment will be maintained maintained at the command post.

- Fire Extinguisher
- Eye Wash
- First-Aid Kit
- 5 Gallons of Fresh Water (for flushing of skin)

10.5 EMERGENCY CONTACT NUMBERS

Munster Community Hospital.....(219) 836-1600
Griffith Police (Emergency).....(219) 924-3141
Griffith Police (Non-Emergency).....(219) 924-7503
Griffith Fire Department.....(219) 924-3151
Fagin-Miller Ambulance.....(219) 924-6543
National Poison Center.....(800) 942-5969
National Response Center.....(800) 424-8802
U.S. Environmental Protection Agency
    Emergency Environmental Response.....(312) 353-2318
    Hazardous Waste Hotline.....(800) 621-3191
Donald Woods, Director of Risk Management, Warzyn Engineering, Inc.
    Office.....(312) 773-8484
    Home.....(312) 352-0129

Hospital route maps will be posted at the command post and will be maintained in each site vehicle. A copy of the hospital route map is shown in Figure 4.

Table 1
Disposal Locations and Waste Types

LOCATION	CLASSIFICATION	WASTE TYPES
American Chemical Services, Inc. Property		
Off-site Containment Area (Figure 3/Location C)	Documented Waste Disposal Location	Drums of PCB-contaminated waste. 10,000 cubic yards of distillation bottoms (drummed). Drums containing solidified materials. 68 cubic yards of incinerator ash Chlorinated solvents Acetone MEK still bottoms Cresylic acid, cyanide and chromium from plating operation Lead pigments Several hundred cases of empty bottles that had contained 2,4,D and 2,4,5-TP Tank truck containing 500 gallons of solidified paint 200 drums containing solvent solids of benzene, amylacetate, dimethyl aniline, diethylether.
On-site Containment Area (Figure 3/Location E)	Documented Waste Disposal	400 drums of sludge and semi-solids of unknown type.
Old Still Bottom Pond (Figure 3/Location F)	Documented Waste Disposal Location	253,510 gallons and 2,000 drums of still bottom sludge, containing 1,1,1-trichlorethane, trichloroethylene, methylene, chloride, toluene, benzene, and other low boiling point solvents.

Table 1
Disposal Locations and Waste Types
(Continued)

LOCATION	CLASSIFICATION	WASTE TYPES
Treatment Pond Number 1 (Figure 3/Location G)	Documented Waste Disposal Location	200 drums containing solvent, solids of benzene, amylacetate
Kapica Drum, Inc. Drum Draining Area (Figure 3/Location L)	Suspected Soil Contamination Location	Drum residue and drum rinse water from drum recycling operation.
Old Drum Storage Area (Figure 3/Location M)	Suspected Soil Contamination Location	Suspected soil contamination from unknown waste type
Old Wastewater Trenches (Figure 3/Locations I, J, K)	Suspected Soil Contamination	Suspected soil contamination from wastes containing 1,1,1-trichloroethane, trichloroethylele, methylene chloride, tolune, benzene and other low boiling point solvents.
Kapica Drum, Inc. Property		
(Figure 3/Location O)	Suspected Soil Contamination	Suspected soil contamination from residue and drum rinse water from drum recycling operation.
Griffith Landfill Property		
(Figure 3/Location D)	Suspected Waste Disposal Location	10 gallons per week for 12 years of retained samples containing hazardous substances 2,500 drums of residues from drum recycling operation

TABLE 2
GROUNDWATER CHARACTERISTICS

Compound	Highest Detected
Benzene	29.0 mg/l[1]
Toluene	35.0 mg/l[1]
Vinyl Chloride	3.6 mg/l[2]
Chloroethane	980 mg/l[1]
Ethyl Benzene	10.0 mg/l[1]
1,2-Trans-Dichloroethylene	34.0 mg/l[1]
Methylene Chloride	2.2 mg/l[2]
1,1-Dichloroethane	1.3 mg/l[2]
1,2-Dichloroethane	0.67 mg/l[2]
Trichloroethylene	0.039 mg/l[2]
Phenol	0.750 mg/l[2]
2,4-Dimethyl Phenol	33.0 mg/l[1]
Pentachlorophenol	36.0 mg/l[1]
Bis (2-Chloroethyl) ether	327.0 mg/l[1]
1,1,1-Trichloroethane	1.1 mg/l[1]

Notes:

1 Ecology and Environment Well Sampling Results, November 3, 1982.

2 Phase I Report, Preliminary Hydrogeological Assessment, American Chemical Services, Colfax Avenue, Griffith, Indiana, ATEC Associates, 1/15/86.

3 mg/l - milligrams per liter

TABLE 3
SEDIMENT/SOIL (ON-SITE)
ORGANICS
HIGHEST DETECTED

Compound	Highest Detected[1]
Phenol	26 ppb
Isophorone	6.2 ppb
Naphthalene	12,000 ppb
Fluorene	1,000 ppb
Diethylphthalate	2,500 ppb
Phenanthrene and Anthracene	1,400 ppb
Di-n-Butyl phthalate	1,100 ppb
Bis (2-Ethylhexyl) Phthalate	110,000 ppb
Butlybenzyl phthalate	8,300 ppb
Methyl naphthalenes	32,000 ppb
Dimethyl naphthalenes	22,000 ppb
Diphenyl ether	3,800 ppb

Metals/Cyanide	Highest Detected[1]
Cadmium	<0.2 ug/g
Chromium	11 ug/g
Nickel	9 ug/g
Lead	15 ug/g
Mercury	.049 ug/g
Cyanide	<0.3 ug/g

Notes:

1 Organic Analytical Results from samples collected at American Chemical Services and Griffith Landfill, Griffith Park, Indiana, May 9, 1980. U.S. EPA, CRL, Organic Laboratory Section 6/13/80.

2 Tentatively Identified Compounds (TIC)

3 ppb = parts per bilion
ug/g = micrograms per gram
mg/g = milligrams per liter

TABLE 4
LEACHATE/SURFACE WATER

Compound	Highest Detected
Napthalene	29 ppb[2]
Phenol	350 ppb[2]
Diethylphthalate	10 ppb[2]
Phenanthrene and Anthracene	0.1 ppb[2]
Bis (2-Ethylhexyl) Phthalate	510 ppb[2]
Bis (2-Chloroethyl) ether	300 ppb[2]
Dimethylphthalate	2,300 ppb[2]
(2-Ethoxy) Ethyl Acetate	17,000 ppb[2, 3]
2-(Hydroxymethyl)-1-Pentanol	40,000 ppb[2, 3]
Trimethyl-2-Cyclohexen-1-one	36,000 ppb[2, 3]
N-Methyl-2-Pyrrolidone	11,000 ppb[2, 3]
1- (2-Butoxyethoxy) Ethanol	6,800 ppb[2, 3]
2-Ethylhexanoic Acid	4,100 ppb[2, 3]
Methylphenols (2)	57,000 ppb[2, 3]
Ethylphenols (3)	58,000 ppb[2, 3]
Dimethylphenols (3)	15,000 ppb[2, 3]
Pentylphenol	4,100 ppb[2, 3]
Methoxytrimethylphenol	11,000 ppb[2, 3]
Dimethyl Benzenedicarboxylate	5,300 ppb[2, 3]
2,2,4-Trimethyl-3-Cyclohexene -1-Methanol	1,700 ppb[2, 3]
2-(2-Methoxy-1-Methylethoxy) -1-Propanol	500 ppb[2, 3]
2-(2-Methoxy-1-Methylethoxy) -2-Propanol	43 ppb[2, 3]
1,1-Oxybis-2-Chloroethane	53 ppb[2, 3]
3,3-5-Trimethylcyclohexene	460 ppb[2, 3]
Benzene	1665 mg/l[1]
Ethyl benzene	0.030 mg/l[1]
Toluene	1.34 mg/l[1]
TOX	5.74 mg/l[1]

TABLE 4
LEACHATE/SURFACE WATER
(Continued)

Metals/Cyanide	Highest Detected
Cadmium	184 ug/l[1]
Chromium	254 ug/l[1]
Nickel	544 ug/l[1]
Lead	282 ug/l[1]
Mercury	0.8 ug/l[1]
Cyanide	96 ug/l[1]

Notes:

1 Letter: ATEC Associates to L. Rundio, May 2, 1986 transmitting results from March 1986 sampling.

2 Organic Analytical Results for samples collected at American Chemical Services and Griffith Landfill, Griffith Park, Indiana, May 9, 1980, U.S. EPA, CRL, Organic Laboratory section, 6/13/80.

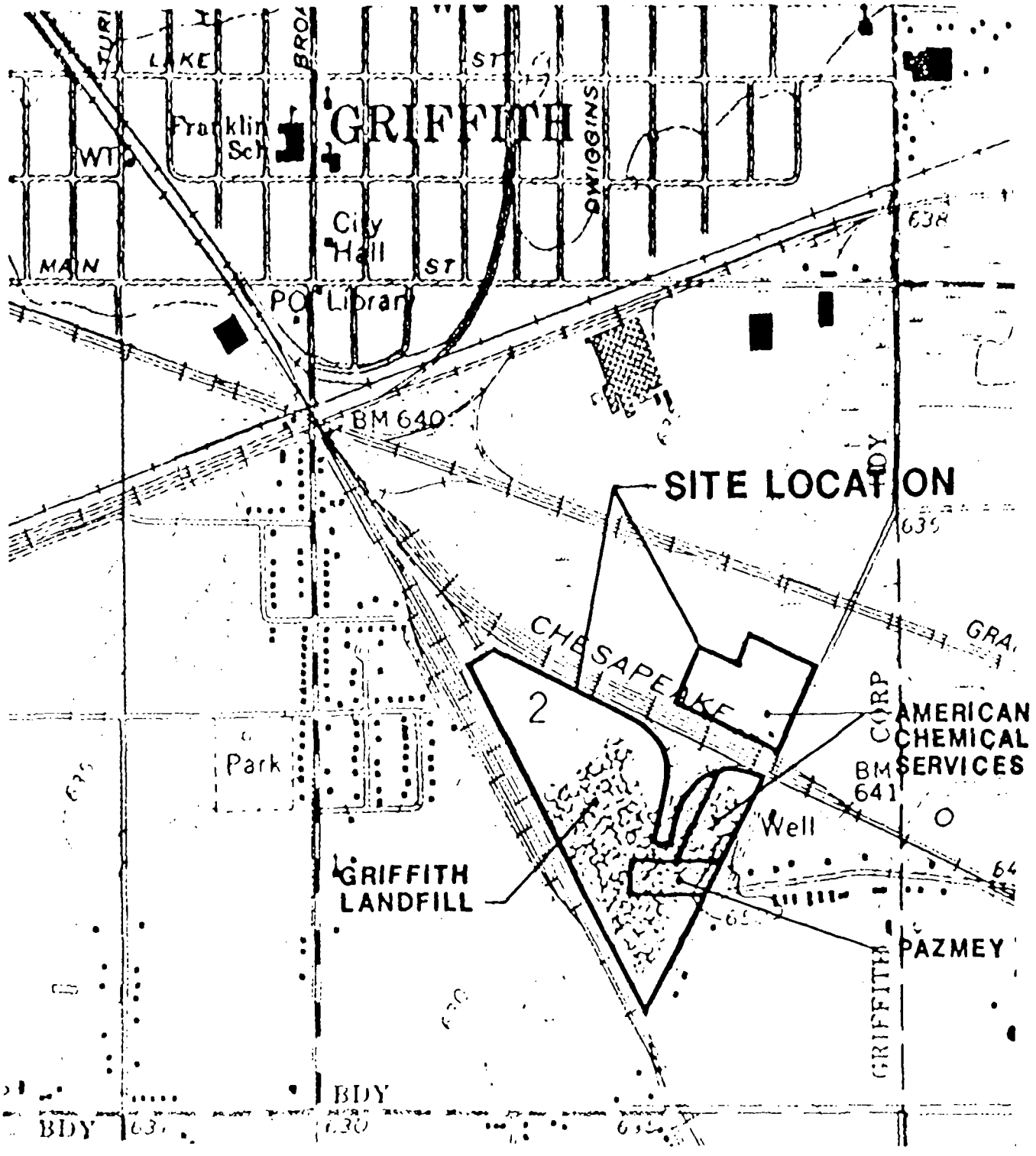
3 Tentatively Identified Compounds (TIC)

4 ppb = parts per billion
ug/l = micrograms per liter
mg/l = milligrams per liter

Table 5
Chemical Hazard Information

Compound	Odor Characteristic	Odor Threshold (ppm)	Ionization Potential (ev)	Vapor Pressure (ppm)	TLV (ppm)	Dermal Toxicity
Benzene	aromatic hydrocarbon	4.68	9.25	75	10	extreme
Dichloethylether (bis 2-chloroethyl ether)	chlorinated solvent-like	--	--	0.4	5	extreme
Ethyl chloride (chloroethane)	ether-like	3.7 - 4.4	10.97	1064	1000	moderate local
Ethylbenzene	aromatic hydrocarbon	14	8.76	7.1	100	high
Phenol	sweet tarry odor	0.05	8.5	0.36	5	--
Phthalates	--	--	--	0.01	5	--
Trichloroethane	chloroform-like	100	--	100	350	high
1,2-Trans-Dichloroethylene	ether-like	275	9.65	180-265	200	--
Toluene	benzyl-like	.17 - .40	8.82	22	100	slight
Vinyl Chloride	faintly sweet	260	9.99	2580	5	extreme

FIGURES



NOTE:

1. SITE LOCATION MAP WAS DEVELOPED FROM U.S.G.S. 7½ MINUTE QUADRANGLE MAP ENTITLED HIGHLAND, INDIANA 1968, PHOTOREVISED 1980.

north

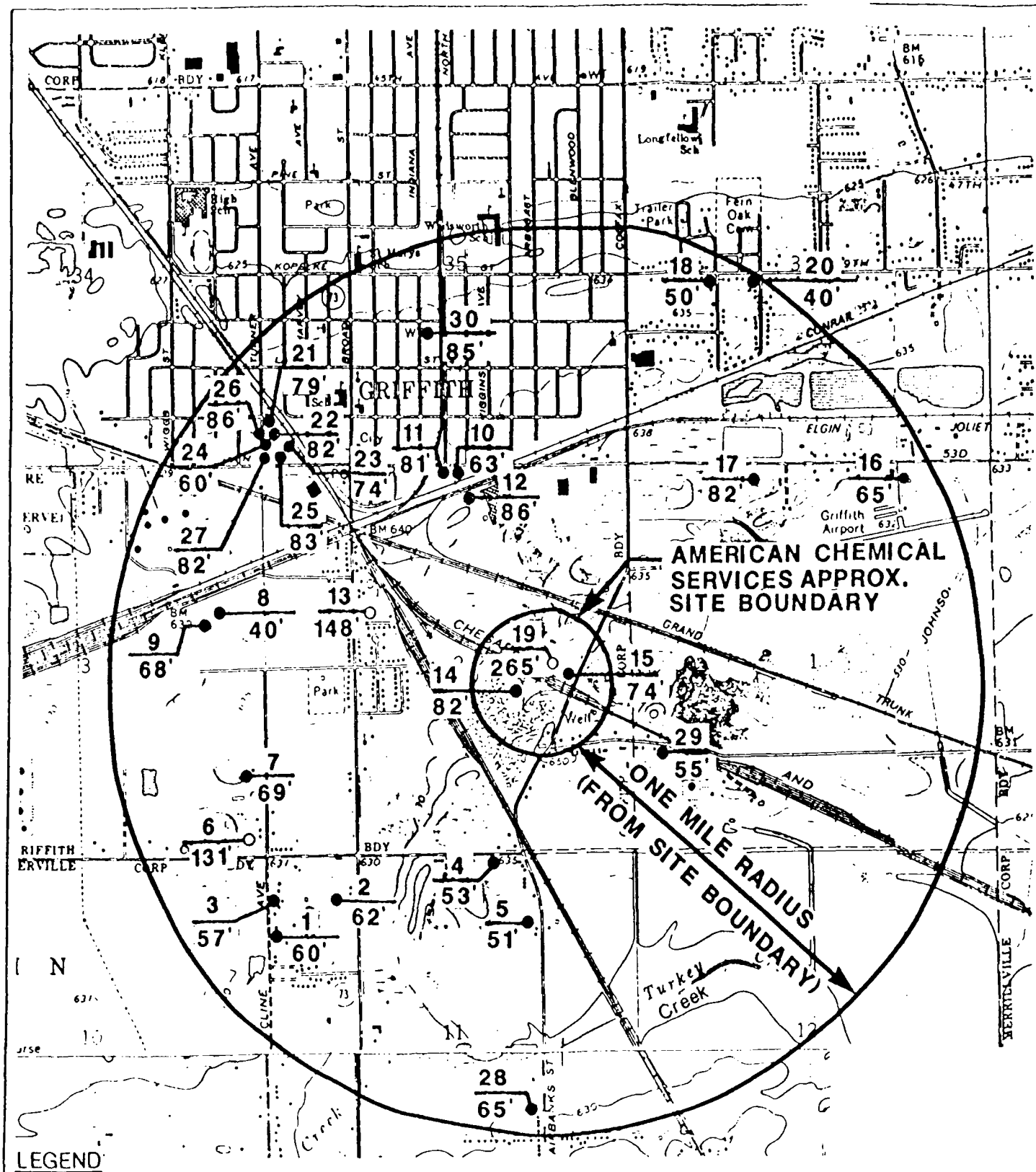
SCALE: 1"= 1000'

FIGURE 1

DWN SJP	APP'D PJV	DATE 9/23/88	60251-A2

WARZYN

SITE LOCATION MAP
RI/FS
AMERICAN CHEMICAL SERVICES SITE
GRIFFITH, INDIANA



LEGEND

1 - WELL REFERENCE NUMBER
60 - DEPTH OF WELL (FEET)

● WELL SCREENED IN UNCONSOLIDATED AQUIFER

○ WELL SCREENED IN ROCK AQUIFER

NOTE

1. BASE MAP DEVELOPED FROM THE HIGHLAND, INDIANA AND THE ST. JOHN, INDIANA 7 1/2 MINUTE USGS QUADRANGLE MAPS. DATED 1968 AND 1962 RESPECTIVELY PHOTOREVISED 1980.
2. WELL REFERENCE NUMBERS REFER TO ATEC REPORT, JANUARY 1985.

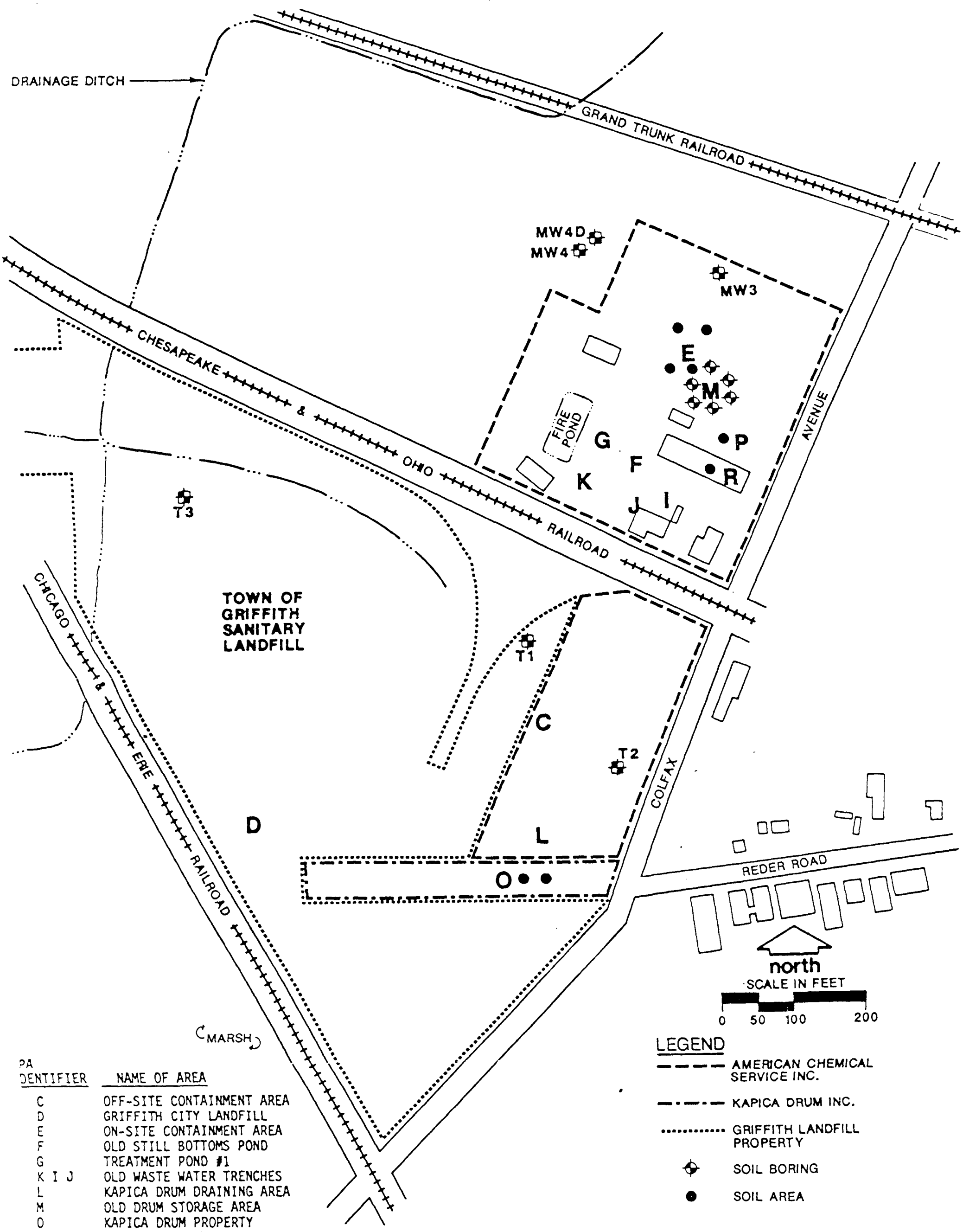
FIGURE 2

DWN JC	APP'D BV	DATE 9/23/88	60251-A3

WARZYN

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
WATER WELL LOCATIONS
AMERICAN CHEMICAL SERVICES SITE
GRIFFITH, INDIANA

TELEDYNE POST NA2178



PA

IDENTIFIER	NAME OF AREA
C	OFF-SITE CONTAINMENT AREA
D	GRIFFITH CITY LANDFILL
E	ON-SITE CONTAINMENT AREA
F	OLD STILL BOTTOMS POND
G	TREATMENT POND #1
K I J	OLD WASTE WATER TRENCHES
L	KAPICA DRUM DRAINING AREA
M	OLD DRUM STORAGE AREA
O	KAPICA DRUM PROPERTY
P	FUME INCINERATOR
R	PREVIOUS SPILL/FIRE

FIGURE 3

SOIL BORING & SOIL AREA LOCATIONS
REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
AMERICAN CHEMICAL SERVICES SITE
GRIFFITH, INDIANA

WARZYN
WARZYN ENGINEERING INC
Madison · Milwaukee
Minneapolis · Chicago
Detroit

Project Number 60251-86

Designed By | Drawn By SR | Checked By MAA
Approved By DSV | Date 9/23/88
Scale AS SHOWN | Reference

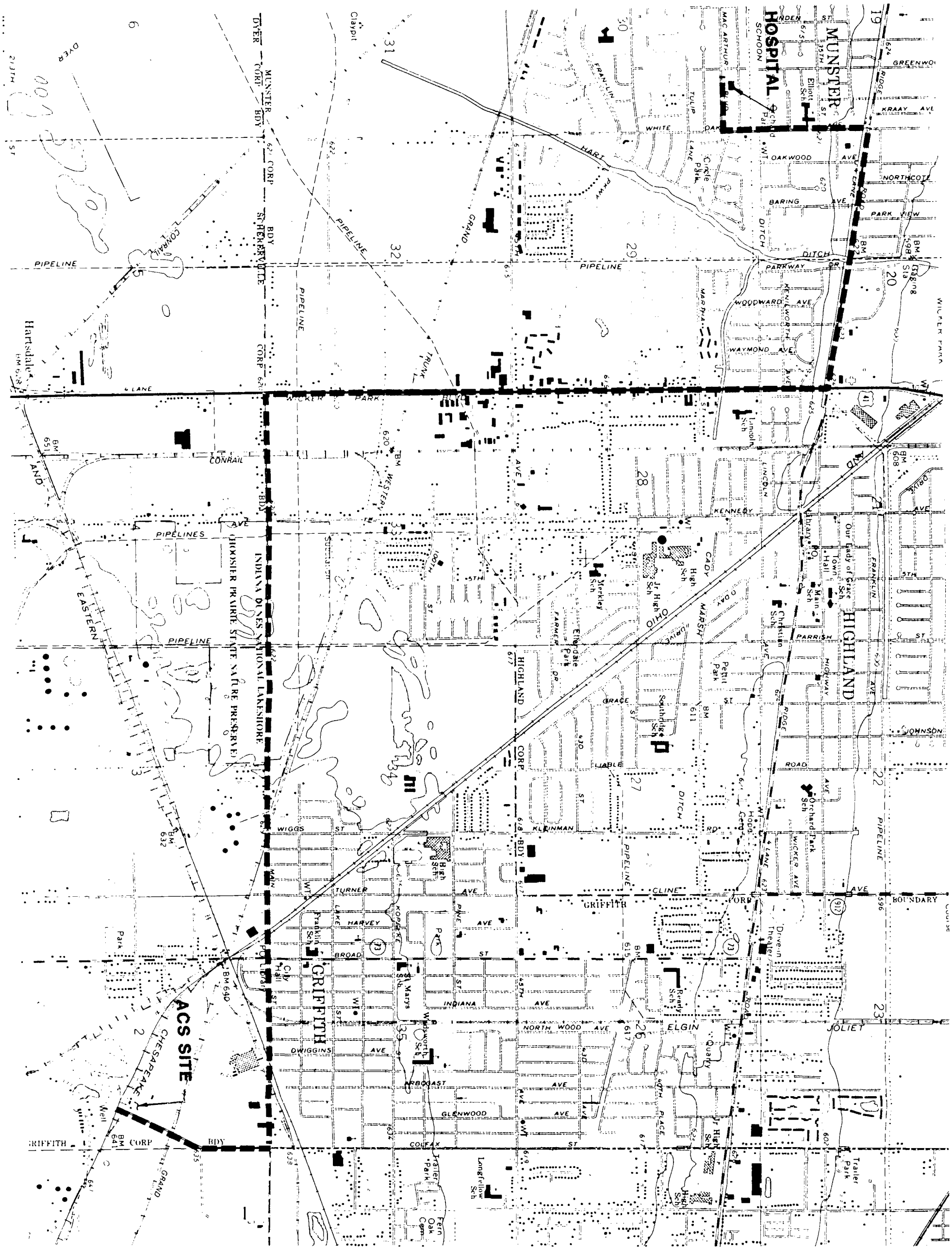


FIGURE 4

ROUTE TO HOSPITAL

REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
AMERICAN CHEMICAL SERVICES SITE
GRIFFITH, INDIANA

Project Number 60251
Sheet Number OF

Revisions | Date · By · App'd

WARZYN
WARZYN ENGINEERING INC
Madison · Milwaukee
Minneapolis · Chicago
Detroit

Designed By | Drawn By D.L.L. | Checked By
Approved By PJV | Date 9/23/88
Scale | Reference

APPENDIX A

GLOSSARY

APPENDIX A - GLOSSARY

ACGIH -- The American Conference of Governmental Industrial Hygienists

IDLH -- "Immediately Dangerous to Life or Health." This entration represents a maximum level from which one could escape within 30 minutes without any escape-impairing symptoms or any irreversible health effects.

PEL -- The Permissible Exposure Limit. This is the same as the TLV.

STEL -- Short Term Exposure Limit. This is the maximum concentration to which workers can be exposed for a period up to 15 minutes continuously without suffering from 1) irritation, 2) chronic or irreversible tissue change, or 3) narcosis of sufficient degree to increase accident proneness, impair self-rescue, or materially reduce work efficiency, provided that no more than four excursions per day are permitted, with at least 60 minutes between exposure periods, and provided that the daily TLV is also not exceeded.

TLV -- Threshold Limit Value. This refers to the time weighted average concentration for a normal 8-hour workday or 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

Ceiling TLV - That concentration which should not be exceeded even instantaneously.

UEL -- The Upper Explosive Limit of substance in air, as expressed in percent by volume. This indicates the percent of a substance, when present in air, which presents a potential risk of explosion.

LEL -- The Lower Explosive Limit of a substance in air, as expressed in percent by volume. This indicates the percent of a substance, when present in air, which presents a potential risk of explosion.

APPENDIX B

HOT AND COLD WEATHER CONSIDERATIONS

APPENDIX B - HOT AND COLD WEATHER CONDITIONS

Hot Weather Conditions

Working under hot weather conditions requires special health and safety considerations. Heat is generated in the body as a result of normal oxidation processes. Heat, which is produced within the body, is brought to the surface by the bloodstream, and escapes to the cooler surroundings through conduction and radiation. If the surrounding air temperature is equal to or above the body temperature, however, body heat can only be lost through the evaporation of moisture from the skin. The effectiveness of this cooling process decreases as the air humidity increases. Therefore, the cooling system of the human body is greatly reduced on hot, humid, still days. It is on such days (or more commonly, a succession of such days) that the threat of heat-related medical emergencies becomes greatest.

When working during hot weather conditions, specific steps should be taken to lessen the occurrence of heat-related emergencies. These include:

- Drinking plenty of fluids (particularly "Gatorade" or related drinks)
- Taking frequent breaks and cooling off
- Working during cooler parts of day (if possible) such as 5 a.m. to 11 a.m., and 6 p.m. to nightfall

Wearing protective clothing significantly impairs the natural cooling system of the body. Therefore, when such clothing is worn, especially Levels A or B, special care must be taken to allow the body to cool at regular intervals. The following table shows suggested guidelines for wearing protective clothing during hot weather.

Ambient Temp. (degrees F)	Max. Wearing Time (min) per Excursion
above 90	15
85 - 90	30
80 - 85	60
70 - 80	90
60 - 70	120
50 - 60	180

A minimum break period of 10 minutes will be taken. To assess the effectiveness of this "rest-recovery" regime, the heart rate should be monitored using the following system.

1. Count the pulse rate for the last 30 seconds of first minute of three minute period, the last 30 seconds of the second minute, and the last 30 seconds of the third minute.

2. Double the count.

If the recovery pulse rate during the last 30 seconds of the first minute is at 110 beats/minute or less, and the deceleration between the first, second and third minutes is at least 10 beats/minute, then the work-recovery regime is acceptable. If this is not true, a longer rest period is required, and the intake of fluids should be increased.

Heat-related emergencies fall within three categories: heat cramps, heat exhaustion and heat stroke.

HEAT CRAMPS

Symptoms: Painful muscle cramps in legs and abdomen; faintness; profuse perspiration.

Cause: Usually affect people who work in hot environments and are heavy perspirerers. May result from too great or too quick consumption of cold drinks. Caused by loss of salt from body.

Care: Remove patient to cool place. Provide with sips of Gatorade (or equivalent). Apply manual pressure to cramped muscle.

HEAT EXHAUSTION

Symptoms: Weak pulse and generalized weakness rapid and shallow breathing; pale, clammy skin; profuse perspiration; dizziness/unconsciousness.

Cause: To aid in cooling of body, large amount of blood is sent to surface area. In upright position, much blood also in lower extremities. This may lead to inadequate return of blood to heart, causing physical collapse.

Care: Remove patient to cool place and remove clothing as possible. Provide with cool water, "Gatorade" or equivalent. Fan to cool but do not chill. Treat for shock.

HEAT STROKE

Heat stroke is the most severe heat-related medical emergency and represents a profound collapse of the body's heat-regulating mechanism. It is a serious threat to life, with a twenty-percent mortality rate. Alcoholics are extremely susceptible to this condition.

Symptoms: Dry, hot, flushed skin; dilated pupils; fast pulse; early loss of consciousness; breathing pattern - initially deep, later shallow or almost absent; muscle twitch (eventually convulsions); body temperature of 105 degrees F or greater.

Cause: Direct exposure to sun, poor air circulation, poor physical condition, advanced age (over 40).

Care: Patients suffering from heat stroke should be regarded as EXTREME MEDICAL EMERGENCY and transported to a medical facility as soon as possible. Assure open airway. Douse body with water or wrap in wet sheet or cloths. Apply cold packs under arms, around neck, at ankles. Assist during convulsions to protect from injury.

Cold Weather Conditions

Hypothermia is an acute problem resulting from prolonged cold exposure and heat loss. This is almost always the result of improper dress. Exasperating the problem is the fact that as an individual becomes fatigued during physical activity, he will be more prone to heat loss, and, as exhaustion approaches, sudden dilation of the blood vessels occurs, with the resultant rapid loss of heat.

In general, proper dress can be worn in the field to protect from the occurrence of hypothermia. The use of protective tyvek coveralls also aids in this, in that they are effective in shielding the body from winds, and maintain an insulating air layer between the coverall and the clothing.

Frostbite is the greatest threat to the field worker during cold weather. Frostbite occurs when there is actual freezing of the tissues. The theoretical freezing point of the skin is about 30 degrees F; however, the increasing wind velocity, heat loss is considerably greater, and frostbite will occur more rapidly. Because the face is generally exposed during field work, it is highly susceptible to frostbite. Care should be taken to ensure that the facial skin does not approach freezing temperatures. At the first signs of numbness or stinging, the worker will return to a warm environment and allow the face to warm-up. When possible, wind-blinds may be constructed to shield workers from prevailing winds.

The hands and feet must also be carefully protected from frostbite. Proper footwear, both insulated and waterproof, should be worn at all times. Inner glove liners, made of cotton or similar material, will aid in keeping the hands warm. Care should be taken to keep the hands and feet from becoming overly cold. At the first signs of numbness or stinging, the worker will find appropriate warm shelter and allow the feet and hands to warm thoroughly before returning to work.

APPENDIX C

HYDROGEN CYANIDE CONTINGENCY PLAN

APPENDIX C - HYDROGEN CYANIDE CONTINGENCY PLAN

Should hydrogen cyanide levels in excess of 10 ppm be encountered, workers will withdraw upwind. If not on-site, the Site Safety Officer will be contacted. The excavation/drill hole will be allowed to vent and then be rechecked by the Site Safety Officer. If levels are below 10 ppm, work will be continued, with close HCN monitoring.

If levels do not fall below 10 mmp within 20 to 30 minutes, the area will be covered as best as possible with available materials. Workers will remain upwind at all times during this closure operation. The Site Safety Officer will be in charge of this operation. Re-entry of a "closed" area will not be performed without close consultation with the client.